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PUBLIC SERVICE COMMISSION OF WISCONSIN



Report to the Legislature on Horizontal Market Power in Wisconsin Electricity Markets

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I. Background

1999 Wisconsin Act 9 created Wis. Stat. § 196.025(5)(ar) as part of Reliability 2000 Legislation directing the Commission to “contract with an expert consultant in economics to conduct a study on the potential for horizontal market power, including the horizontal market power of electric generators, to frustrate the creation of an effectively competitive retail electricity market in this state and to make recommendations on measures to eliminate such market power on a sustainable basis.” On February 15, 2000, the Commission issued a Request for Proposal to select the expert consultant. On March 22, 2000, responses to the request for proposal were received; and on April 24, 2000, the Commission awarded a \$149,800 contract to Tabors, Caramanis and Associates (TCA) of Cambridge Massachusetts to conduct the study. At the Commission’s open meeting on October 31, 2000, the consultant presented its findings, and on November 2, 2000, the final report was delivered to the Commission and made available to the public.

The Commission believes that the consultant’s final report entitled, “Horizontal Market Power in Wisconsin Electricity Markets,” has satisfied the requirements of the request for proposal and that the study was conducted in a professional, objective, and thorough manner. A copy of TCA’s final report, as revised November 14, 2000, is attached. In order to provide interested persons an opportunity to comment on the TCA final report, on November 3, 2000, the Commission issued a Notice of Proceeding and Request for Comments in docket 05-EI-120, Market Power Study for Retail Competition. Comments from 13 interested persons were received November 30, 2000. Copies of these comments are attached. The following material provides a summary of the report’s methodology and findings, discusses the comments received, and offers the Commission’s initial commentary. At a later date, the Commission may offer additional guidance to the legislature concerning horizontal market power issues in Wisconsin electricity markets.

II. Technical Requirements of the Market Power Study for Retail Competition

The study called for by statute required an economic analysis of the extent and impact of horizontal market power by electric generators in Wisconsin electricity markets. Horizontal market power refers to the ability of a seller to maintain prices above competitive levels for significant periods of time. The horizontal market power mitigation study for retail competition was comprised of both a structural and behavioral economic analysis of electricity markets in Wisconsin. The structural analysis covered the period 2001 to 2004, and the behavioral analysis covered the period ending in 2007. The objective of the structural analysis in the study was to outline and describe the general extent of market power in Wisconsin electricity markets using standard anti-trust methods. This ordinarily requires an examination of measures of market concentration. The objective of the behavioral analysis, which constituted 75 percent of the study, was to take advantage of computer modeling advances in order to allow a more comprehensive quantitative measurement of the potential for electric generators to wield market power over electricity prices.

Both the structural and behavioral parts of the economic study used current data and examined the extent of market power in Wisconsin by focusing on relevant electricity products, geographic markets, and potential suppliers. Both components factored in relevant local, statewide, and regional transmission system import capabilities and constraints. The Commission staff assisted TCA in the preparation of necessary input data and assumptions.

The behavioral economic analysis of Wisconsin electricity markets employed a sophisticated production cost computer model, GE MAPS, to simulate both Wisconsin's and the upper Midwest's electric industry structure and operation. The computer modeling analysis utilized data on all relevant Wisconsin and regional electricity generating firms and facilities including those owned by public utilities, merchant power plants, independent power producers, or electric cooperatives. The GE MAPS computer model was able to calculate market clearing prices using appropriate electricity demand, supply and dispatch factors.

In order to identify and quantify potential market power problems in Wisconsin in terms of the effects on electricity prices in the state and on the amounts of withheld electricity supply, TCA also used another computer model, COMPEL, in conjunction with the GE MAPS model to perform the behavioral economic analysis. The COMPEL computer model is a proprietary TCA model developed with National Science Foundation research support that can simulate strategic anti-competitive behavior by market participants in terms of either bidding up market prices above competitive levels or by the withholding of electric generating supply. The COMPEL model was used to identify those entities and electricity generating facilities holding potential market power and possibly hindering the development of competitive wholesale and retail electricity markets in the state. Both of the consultant's computer models were in accord with contemporary economic theory, state-of-the-art quantitative practice, and electrical engineering practice.

Using the framework of both the structural and behavioral analyses, the TCA study then identified specific horizontal market power issues and made recommendations on measures to eliminate such horizontal market power concerns on a sustainable basis so as to foster the creation of an effectively competitive wholesale and retail electricity market. The Commission gave the consultant wide latitude in making appropriate industry restructuring recommendations; however, each TCA recommendation had to be empirically tested for effectiveness in reducing market power on a sustainable basis through the use of behavioral computer modeling of Wisconsin electricity markets.

The TCA study examined additional horizontal market power impacts as well. These included effects on public utility workers and shareholders as well electric cooperative workers and members. As part of its electricity price analysis, the TCA study modeled the effect on the rates of public utility customers and electric cooperative members. Lastly, the market power study provided the first estimates of the amount of stranded benefits in Wisconsin, defined as the difference between the higher market value of power plants and their respective depreciated book values.

III. Major Conclusions of the Tabors, Caramanis and Associates Study

The TCA study began with a baseline simulation of the electricity markets in Wisconsin for the period 2001 to 2007 in which electricity sellers are presumed to sell their output at strictly competitive prices as defined by economic theory, basically the marginal cost of production. Such a baseline represented the situation of a well functioning competitive electricity market in Wisconsin in which no market power would be exercised. The TCA study then simulated the Wisconsin electricity market using an altered pricing assumption, namely that electricity sellers could now engage at will in strategic bidding or capacity withholding as a means to drive electricity prices above competitive norms thereby harming customers in order to make above average profits for shareholders. The difference between these two simulations quantified the potential extent of generator owners to exercise market power and provided the foundation for the following conclusions:

- ✍✍ The structural economic analysis indicates that potential exists for the exercise of horizontal market power by generation owners within the Wisconsin Upper Michigan System (WUMS) because of the highly concentrated ownership of electric generation. This potential is greatest under existing transmission limitations, but the potential remains even after transmission import capacity is assumed to increase to 3,000 MW.
- ✍✍ Wisconsin Electric Power Company (WEPCO) has the largest market share in all relevant geographic and product markets within WUMS. WEPCO's share of deliverable generating capacity ranges between 30 and 60 percent.
- ✍✍ The behavioral economic analysis indicates, that under the current ownership structure, the level of horizontal market power in the WUMS region would prevent the creation of an effectively competitive retail electricity market. The presence of horizontal market power in WUMS would lead to electricity prices that would be 40 to 60 percent higher in the 2001 to 2003 period and almost 20 percent higher in the 2004 to 2007 period. These higher electricity prices would translate into 30 to 80 percent increases in utility profits for the 2001 to 2003 period and 10 to 30 percent increases in utility profits during the 2004 to 2007 period.
- ✍✍ A workably competitive retail electricity market could be achieved by implementing two changes to the current market structure, namely the divestiture of WEPCO generation assets among three independent companies and the requirement that owners of existing generation commit a significant portion of their capacity under fixed price contracts or standard offer service. Under such circumstances, electricity rates would be significantly lower than would prevail if market power were not mitigated.
- ✍✍ Workably competitive retail markets would not result in stranded costs, but instead would result in \$3.22 billion in stranded benefits. In Wisconsin, the market value of electric generating plants could be 2.7 times their net book value.
- ✍✍ Workably competitive retail markets should not have adverse effects on employees of existing generating units since those units will remain profitable.

✍✍ The recently enacted legislation allowing the entry of independent power producers and wholesale merchant power plants into Wisconsin assists in the reduction of horizontal market power, but such entry is not sufficient to discipline incumbent generation owners from exercising horizontal market power.

IV. Review of Comments on the Tabors, Caramanis and Associates Study

Results of the TCA study on horizontal market power, as summarized above, are provocative and far reaching. The TCA study was conducted in an independent manner, and conclusions are solely those of the study's authors. In order to obtain feedback, the Commission requested that interested persons comment on the findings of the TCA study as well as its methodology. Thirteen interested persons provided their input: Alliant Energy, Calpine Corporation & SkyGen Energy LLC, Customers First! Coalition¹(CFC), Dairyland Power Cooperative (DPC), Local Union 310 of the International Union of Operating Engineers, Local Union 2150 of the International Brotherhood of Electrical Workers, Midwest Independent Power Suppliers Coordinating Group (MWIPS), PG&E National Energy Group (PG&E), Professor Eric Schenker, Wisconsin Industrial Energy Group (WIEG), WEPCO, Wisconsin Public Service Corporation (WPSC), and Xcel Energy (Xcel). The following discussion provides brief highlights of those comments as they regard the TCA study results and methods.

Alliant Energy a/k/a Wisconsin Power and Light Company

Alliant Energy believes the TCA study has serious flaws. Alliant Energy believes the report is systematic and concise; however, it fails to include any analysis of the opportunities and challenges of attracting additional generation to WUMS. Alliant makes two specific criticisms in this regard. The first is that electricity prices in the study are too low to encourage the investment of the necessary capital to meet the need for additional generation capacity in the WUMS market. Alliant Energy notes that correctly estimating the amount of new generation entering the market is critical to understanding how long, if ever, potential market power will exist in WUMS. The second criticism is that the price of natural gas used in the study was too low. These shortcomings, according to Alliant Energy, understate the degree to which a competitive market would produce adequate investment in new transmission and generation, thus disciplining any potential market power. Alliant Energy, consequently, believes there is little need for the remedies, particularly divestiture, that were recommended by the TCA study.

¹ The Customers First! Coalition is comprised of Wisconsin Public Power Inc., Madison Gas and Electric Company, Dairyland Power Cooperative, Wisconsin Federation of Cooperatives, Municipal Electric Utilities of Wisconsin, and the Citizens' Utility Board.

Calpine Corporation and SkyGen Energy LLC

Calpine Corporation indicates that the TCA study makes two very important conclusions. The first is that new entry of commercial generation can help to reduce market power in WUMS, especially if utilities do not construct additional generation. The second is that utilities should be required to enter into fixed price contracts. Calpine Corporation is supportive of these two recommendations but believes that several changes must be made to the current regulatory environment to further incent independent power producers to construct additional generation capacity in Wisconsin, which would then act to reduce horizontal market power.

Customers First! Coalition

The CFC believes that the TCA study shows that Wisconsin faces severe market power problems that will make a successful transition to retail competition very difficult. The CFC believes the TCA study corroborates the findings of its own horizontal market power study which also recommended the divestiture of WEPCO into three independent generating companies. Unlike the TCA study, however, the CFC believes that market power problems would remain even after such a WE divestiture. The CFC believes that the TCA study has, in fact, understated the amount of horizontal market power in WUMS and that even companies like WPSC and Alliant Energy might need to divest some generating capacity. The CFC points out that the TCA study made several assumptions that together act to understate the true extent of market power. The CFC believes that the TCA study has improperly made the assumption that all new transfer capability produced by transmission improvements will go to competitors outside of Wisconsin. The CFC believes the TCA assumption of expanding transmission capacity to 3,000 MW in 2004 is too optimistic. It also believes the TCA study used too low a price of natural gas, and that the TCA assumption of no pancaking of transmission tariffs looks suspect given recent developments surrounding the Midwest Independent System Operator. The CFC as well believes the TCA study used too low a price for new electric generating capacity and used too large a degree of demand responsiveness to changes in electricity prices. The CFC also raises questions about the standard offer contracts proposed by TCA.

Dairyland Power Cooperative

DPC supports the comments of the CFC. In addition to those comments, DPC believes that the TCA study did not address the impacts of market power on electric cooperative members. DPC also believes that the TCA study only focused on electricity rates and stranded benefits of the major investor-owned utilities.

International Brotherhood of Electrical Workers-Local Union 2150

Local 2150 takes issue with the TCA study's conclusion that mitigation measures should not have an adverse impact on public utility and electric cooperative employees. Local 2150 believes the TCA study's reliance on an assumption that operations and maintenance expenditures could be reduced by 20 percent due to a competitive market response calls such a conclusion into question. Local 2150 does not support divestiture, indicating that there is already a great public benefit to WEPCO's regulated size, namely low electricity rates and a high degree of reliability.

International Union of Operating Engineers-Local Union 310

Local 310 believes that very little will ever come from the TCA study. This is because until Wisconsin has more than adequate generation and transmission, there will not be a competitive market. Local 310 believes there will be negative ratepayer impacts associated with divestiture. It also believes the estimates of stranded benefits may change due to a fast changing utility environment. Local 310 believes that the creation of a competitive market, with generation yet to be built, will reduce or eliminate existing horizontal market power.

Midwest Independent Power Suppliers Coordinating Group and PG&E National Energy Group

MWIPS and PG&E believe that competitive power suppliers can contribute significantly to the mitigation of market power with Wisconsin by building new generation to increase the state's supply of electricity. However, MWIPS and PG&E believe that while generation divestiture can be a powerful tool for mitigating market power of incumbent utilities, divestiture remedies coupled with long-term contracts can have the opposite effect by eliminating any incentive for competitive electric suppliers to build new capacity. In addition, divestiture at other than full market prices could result in a generating company that is a super-competitor relative to independent power producers who constructed their capacity at full price. Together, such developments and remedies could drive independent power producer competitors out of the marketplace, thwarting attempts to reduce market power and thereby harming consumers in the long run.

Dr. Eric Schenker, Dean and Professor Emeritus

Dr. Schenker believes the TCA study used standard academic assumptions of the past and that the remedies proposed by the TCA study do not provide a real world solution for Wisconsin. Dr. Schenker points out that breaking up WEPCO will make it extremely difficult to attract the new capital needed to modernize the electric system in Wisconsin. In addition, such divestiture would result in the state losing Wisconsin-based companies whose focus has been on doing what is best for the state.

Wisconsin Industrial Energy Group

WIEG strongly supports the TCA study and its results. However, WIEG believes that certain TCA assumptions tend to understate the magnitude of the market power problem and that estimates of the stranded benefits are too low. WIEG points out these particular problems: the TCA study improperly makes the assumption that all new transfer capability produced by transmission improvements will go to competitors instead of incumbent utilities; that the assumption of expanding transmission capacity to 3,000 MW in 2004 is optimistic; that the TCA study used too low a price of natural gas; that price caps at \$300 MWh should not have been used; and that there is too large a degree of demand responsiveness to changes in electricity prices in the TCA study. WIEG expresses the concern that the divestiture remedy in the TCA study could be counter productive if it focuses attention only on WEPCO as the source of market power problems; other participants such as Alliant Energy or WPSC may need appropriate restrictions in order to arrive at a workable competitive market. Lastly, WIEG indicates that the estimate of stranded benefits at \$3.2 billion is too low because it does not factor in the existence of market power in the current

industry structure that can increase the value of existing power plants, nor the impact that high natural gas prices would have on the market value of existing low cost coal facilities, nor the market value of hydro electric generating assets.

Wisconsin Electric Power Company

WEPCO provided numerous criticisms of the TCA market power study and its results. Unlike the TCA study's finding, WEPCO believes that forced divestiture would adversely affect workers, utility stockholders, and customers. WEPCO also indicates that the estimates of stranded benefits are in error and not justified by the underlying TCA analysis. WEPCO notes that the TCA computer models are undersupplied in terms of generating capacity in the early years of the analysis, leading to unduly high peak electricity prices. WEPCO states that the study's premise of immediate and complete wholesale and retail deregulation is extreme, thereby exaggerating the extent of market power problems. WEPCO indicates that the estimates of prices under perfect competition in the TCA model defy logic within the WUMS operating region. Another WEPCO criticism is that the study ignores the mitigating effects of new entry by wholesale merchant power plants when electricity prices are high. WEPCO believes that inadequate information on COMPEL computer model exists. WEPCO also lists errors in the production cost model's dispatch of WEPCO's generating units as compared to their historical performance. WEPCO believes that the TCA assumption that operations and maintenance could decrease 20 percent would have to affect employment levels contrary to what is stated in the TCA study. WEPCO believes that electricity prices should also be more uniform across WUMS utilities than those portrayed by the study. Despite these criticisms WEPCO points out that the TCA study does properly indicate that contracts between generators and customers are a very effective form of mitigation and are far less disruptive and expensive than divestiture. Moreover, WEPCO concurs with the TCA study finding that prospects for competitive markets in Wisconsin are improved after significant transmission improvements are made.

Wisconsin Public Service Corporation

WPSC believes the TCA study provides a good starting point for the evaluation of market power in Wisconsin and WUMS. Notwithstanding potential shortcomings in the TCA methodology, WPSC indicates that reasonable methods of computing market shares and concentration in WUMS are likely to produce results similar to those produced by TCA in its structural analysis. However, WPSC believes that it is premature to use the TCA study as a basis for any conclusions on market power levels, market power mitigation methods, or stranded benefits. WPSC states that it is most concerned about the limited amount of information regarding assumptions and the two computer models TCA relied on in developing its study. WPSC believes the TCA study is flawed because it uses a theory of market power based on a deregulated marketplace in which output of existing generation plants is sold at market based prices that no stakeholder is advocating. WPSC also points out that the TCA study examined only one potential future and that more sensitivities should have been performed. WPSC believes the estimates of stranded benefits are fundamentally flawed. According to WPSC, the TCA study also does not present an analysis of entry conditions for new power plant developers. Lastly, WPSC believes that general conclusions in the TCA report concerning the inability to develop workably competitive markets for electricity under current electric industry structure go beyond the behavioral results of the computer models utilized. As an example, WPSC

cites that the TCA study failed to analyze a market power remedy in which generators were obligated to supply 80 or 90 percent of native loads at prices determined by regulation or contract.

Xcel Energy a/k/a Northern States Power-Wisconsin

Xcel disagrees with the TCA recommendation that the only effective method of mitigating market concentration and potential market power issues in Wisconsin is to implement divestiture. Xcel believes that the TCA analysis is flawed because it used a static view of the electric industry in that it did not allow for any changes due to outside forces as electric utility industry restructuring is implemented. Xcel also believes that the price of natural gas used in the study is too low and that nitrogen oxide (Nox) compliance for Wisconsin generating units was improperly modeled. Lastly, Xcel indicates that the study incorrectly concludes that there is significant market power in the MAPP region when the structural analysis shows only moderate market power in the MAPP region.

V. Commission Commentary

The TCA study provides a useful starting point for the analysis of potential horizontal market power problems in Wisconsin. Results of the TCA study are plausible in the context of the assumptions used and the particular problem examined, namely a full and immediate deregulation of wholesale and retail electricity markets. Results are not surprising given the degree of market concentration in Wisconsin, particularly WUMS, and the existence of transmission system constraints that limit imports into WUMS.

However, as commenters have pointed out, issues surrounding electric industry restructuring in Wisconsin are far more complex than that which can be simulated with computer models. The Commission concurs with the numerous comments that complete and immediate wholesale and retail deregulation as simulated in the TCA study is not in the public interest at this time, especially in light of dramatic developments in California. It is also true that divestiture is an invasive policy remedy, one that the Commission is not recommending at this time. The TCA study points out that contracts between generators and customers may be an effective form of market power mitigation. The Commission will be exploring such contracts in further detail during 2001 when the Commission considers the restructuring proposals recently put forth by WEPCO and WPSC. The TCA study also indicated that competitive market prospects could improve with an expansion in the state's transmission system. This too is an issue that the Commission will be examining and deciding in 2001 when it focuses on the application of WPSC to construct the Arrowhead-Weston 345 kV transmission line. The Commission agrees with the many respondents who indicated that the primary focus should be on taking the necessary steps to get the requisite new infrastructure in place in order to ensure continued electric system reliability and low electricity rates in the state. Finally, the horizontal market power issues are a complex subject. At a later date, the Commission may offer additional guidance concerning horizontal market power mitigation.

